DOCUMENT RESUME

ED 263 878 IR 011 863

AUTHOR Gleason, Gerald T.; Reed, Timothy
TITLE Computers in the Schools: How Will Educators Cope with the Revolution?
PUB DATE Apr 85
NOTE 9p.; Paper presented at the Annual Meeting of the American Educational Research Association (69th, Chicago, IL, March 31-April 4, 1985).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Academic Achievement; *Adoption (Ideas); Change Strategies; Educational Change; Futures (of Society); Instructional Innovation; Interviews; *Microcomputers; *Organizational Change; Research Methodology; School Districts; School Surveys; *Use Studies
IDENTIFIERS *Computer Uses in Education; Wisconsin

ABSTRACT

A study was implemented to conduct a long-range observation and analysis of the process by which computers are channeled into educational practice. Data collection involved a structured interview with knowledgeable representatives of 35 school districts in Wisconsin. Participating schools were selected randomly and stratified by size. Questions in the interview focused on the status of a district's computer activity to date, including: types of hardware and software available, inservice training activities, district policy statements, and roles of school boards and parent-citizen groups. Results indicate all districts but one utilized computers during 1982-83; the number of computers available ranged from one in a small district to 232 in a large district. When analyzed on a computer/student ratio, there was a range of 1/28 to 1/412, and a mean ratio of 1/156; Apple is the overwhelming choice of schools; and most computers were located either in classrooms (83%), the library (51%), or a computer laboratory (54%): virtually all districts reported multiple placement. Only 10 of 35 school boards had taken any official action concerning computers in their system; however, 80% of the districts had provided inservice training activities during 1982-83. Lack of funds was most often cited as a limitation to implementation efforts and few school districts had any hard data on student home access to computers. A summary, recommendations, and references complete the document. (JB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☒ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

COMPUTERS IN THE SCHOOLS.
HOW WILL EDUCATORS COPE WITH THE REVOLUTION?

Gerald T. Gleason, Professor of Educational Psychology
Timothy Reed - University of Wisconsin - Milwaukee

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Gerald T. Gleason
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

ED263878

Even the most casual observer of the educational scene can not help but be aware of the rapidly expanding use of computers in schools--at all levels. Within a few short years (microcomputers were almost unknown in elementary and secondary schools prior to 1980), we have witnessed a virtual explosion in the use of computers for a wide variety of educational functions. As documented in a comprehensive survey conducted in 1983 by the Center for Social Organization of Schools (1), 42% of elementary and 53% of secondary schools reported that they were using computers.* Harmon and Anderson (2) reported that 97% of Wisconsin school districts were using at least one computer in 1983. It is a reasonable assumption that almost all public elementary and secondary schools have some computers and that the number of computers in schools will continue to grow at an accelerating rate.

Several important questions need to be asked. What impact are the computers having on the educational programs in the schools? How are they influencing students' achievement? What are schools doing to plan for effective utilization of computers? How are schools handling the promises and threats of this new innovation? While firm research evidence is still forthcoming, there is every indication that the computer (or more broadly, instructional technology) will influence the ways in which children learn, and and are taught; the ways in which teachers function; the organization of school curricula; and the very structure and function of the school system as we know it.

INNOVATIONS IN SCHOOLS

How will schools cope with the potential for change provided by the computer? In the early years of novelty and enthusiasm, most schools demonstrated remarkable openness to looking, observing, and experimenting. Precious dollars have been spent on hardware, software, teacher training and curriculum development. But will the novelty wear off? Will the computers gather dust on the shelves like slide-tape machines? Will the computers be assimilated into the on-going programs with little

IR011867

*The overwhelming majority of schools are using microcomputers as opposed to minicomputers or terminals connected to a mainframe computer. We will use the term "computer" to denote all types of applications.

BEST COPY AVAILABLE

or no apparent effect? And, finally, will the demonstrated capability of instructional technology have any significant impact on the fundamental objectives and structure of our educational system?

To assess the process of change, the strategies of implementation, and the long-range impact of technology, we need data which will show how a given district is approaching the problem, what changes are made to accommodate the innovation, and what short-range and long-range effects can be associated with the innovation. The present investigation has been designed to provide data relative to these broad issues.

The objective of the study is to conduct a long-range observation and analysis of the process by which computers are implemented into educational practice. Observational and interview data will be obtained at one year intervals for a period of five years, while the implementation process is proceeding. This series of "snap-shots" of selected districts' activities will provide a current as well as historical data base which will be used to analyze the implementation process.

RESEARCH DESIGN

The design of the study is based on the model proposed by R. K. Yin in his article "Life Histories of Innovations: How New Practices Become Routinized" (3). The model identifies three stages; improvisation, expansion, and acceptance. He specifies a series of ten "events" which must take place as the innovation progresses through the phases. This model provides a useful analysis scheme to obtain answers to such questions as:

1) How are innovations most effectively proposed?
2) Who are the actors and how are their roles defined?
3) What organizational changes must be accomplished?
4) What changes in personnel are necessary?
5) What interfaces with related agencies are required?
6) What are the "ripple" effects of the particular innovation on the broader organization?

Data collection involves a structured interview with knowledgeable representatives of 35 school districts in Wisconsin. Participating schools were selected randomly, stratified by size. Each school was asked to designate a knowledgeable staff member to participate in a telephone interview conducted by the principal investigator and an assistant. Questions in the interview focus upon the status of a district's

activity to date; the types of hardware and software available; inservice training activities; district policy statements; role of School Boards and parent-citizen groups; etc. It is assumed that a 20-40 minute interview provides more valid and reliable data than could be obtained by a written questionnaire.

POPULATION

A modified stratified random selection process was used to identify the participating districts. The four largest districts in the state (50,000 population or more) were invited, and 58 of the remaining districts were randomly selected. Chief district administrators received a letter explaining the purposes of the study and were asked to provide the name of a knowledgeable district employee who would participate in the interview. Of the 62 districts invited, 35 agreed to cooperate. The participating districts are widely dispersed throughout the state and range in size from 203 to 86,387 students. There are varying organizational patterns and a broad range of socio-economic characteristics ranging from urban to rural. Confidentiality was assured for all data and analyses.

DATA COLLECTION

A 46 item structured instrument was developed consisting of definitive data items, (How many computers do you have? Who provides in-service?) and open-ended questions, (What major problems are you facing? What are your plans for next year?). The interviews, conducted May-July 1983, were tape recorded to facilitate data analysis and to provide an historical data base.

RESULTS AND DISCUSSION

The interview was devised to provide quantitative as well as qualitative data. For purposes of this discussion, we will combine the "facts" and "opinions" in an attempt to describe the situation in these 35 districts in 1982-83.

Computer Usage

All districts except one indicated they were using computers during 1982-83.The numbers of computers available was predictably varied; from one in a small district to 232 in a large district. When analyzed on a computer/student ratio, there was a range of 1/28 to 1/412 and a mean ratio of 1/156. These reports are consistent with the results found in other surveys (1, 2).

In Wisconsin, it appears that the Apple is the overwhelming choice of schools; 83% of all districts have Apples, 41% have Radio Shacks, 29% have Pet-Commodores, 20% have Ataris, and 17% have "other" models, most of which are Texas Instruments.

While most schools have purchased a large majority of one particular brand, 57% have acquired small numbers of different types. The dynamic state of the hardware industry will no doubt be reflected in the patterns of acquisition in these schools but a key factor in the decision making will certainly be the amount and quality of software available for the various machines.

The peripheral equipment available varied widely across districts. All schools using computers had at least one disk or tape drive for each computer. The ratio of printers to computers was approximately 1:4 for all schools with considerable variation. Quite surprisingly, only 5 districts have modems available to access remote data bases and 5 districts have graphics tablets. Individual schools reported having other peripherals such as numeric key pads, and speech synthesizers. These data suggest that schools are using the microcomputers as "stand-alone" equipment and have not acquired some of the technology which has the capability of extending the functions and services available in more sophisticated computer systems.

Where are Computers Located?

The largest proportion (29 or 83%) of the districts had computers placed in classrooms; eighteen (51%) had computers in the library, 19 (54%) had them in a computer laboratory and 16 (46%) used them in administrative offices: virtually all districts reported multiple placement. As data for subsequent years are collected, it will be interesting to follow the extent of implementation that can he accomplished in the various locations.

Subject Areas

The following chart indicates the extent of use of computers in various curricular fields.

Subject Area	Schools Reporting Use N=35	
	No.	Percent
Math	34	94
Science	28	78
English-Language Arts	16	44
Humanities	15	42
Art	6	17
Music	13	36
Foreign Language	4	11
Vocational Education	18	50
Business Education	26	72
Special Education	25	69
Computer Programming	18	50
Others (Driver Education, Word Processing, Guidance)	3	8

The extensive use in math and science is not surprising, given the historical roots of computers. It is significant to note that many schools are extending the usage to other subject areas, and this is not restricted to larger districts. In this sample, 12 relatively small districts reported usage in seven or more of the ten areas.

Of course, a major usage determinant is availability of software. For example, in foreign languages, there does not appear to be a ready supply of suitable software on the market. Presumably this situation will change in the coming months and years.

Time-sharing, in which a school has remote terminals connected to a mainframe computer, was the earliest form of computer implementation. The substantial, and for most schools, prohibitive costs of time-sharing was a major deterrent to early computer usage. Somewhat surprisingly, 15 of the 35 districts are using time-sharing. Of these, 9 districts use the services provided by the Cooperative Educational Service Agencies (CESA) which include career development materials and some administrative data processing services (e.g. budgeting, scheduling, etc.). Three districts own minicomputers which are connected to remote terminals and are used for instructional purposes.

Organization for Planning

A key event in the adoption of innovations is the appointment of a district planning and development committee. Twenty-one of the systems reported that a district-wide committee was functioning, and two districts have discipline committees or building committees as well. Virtually all of the committees include classroom teachers in addition to administrators and curriculum supervisors and 7 districts include parents on their committees. Of the 13 districts which do not have committees, 11 indicated that they plan to appoint one in 1983-84.

Official Board Actions

Respondents were asked, "Did your school board take any official action concerning computers in your system?" Only 10 of the 35 Boards had taken actions. These ranged from adoption of a full-scale computer implementation plan to approval of new courses to approval of a grant proposal. If computers are to be fully integrated into school operations, Boards will need to develop short-range and long-range policies and operational procedures. Reports from these 35 districts indicate that only 10 districts (29%) have taken these steps, which suggests that most districts are operating in an "exploratory" or "experimental" mode.

In-Service Activities

The necessity of providing in-service training for teachers in the effective use of computers has been cited as one of the most cruicial factors in the full adoption of this innovation (1). Among these districts, 28 (80%) provided in-service

activities during 1982-1983. The topics included general introduction, training in computer languages, classroom use of software and utilities, and evaluation of hardware and software. The largest proportion (28 districts) of the activities were voluntary but 7 districts required all teachers to participate.

During the next several years, districts will need to develop their in-service programs well beyond the simple 5-10 hours of introduction to computers now provided. The strategies developed to address these issues will influence the rate and extent of instructional implementation of computers.

Limitations to Development

Respondents were asked, "What have been the most serious limitations or constraints to implementation efforts in your district? Twenty-eight of the schools cited "Lack of Funds" as a "serious" or "very serious" limitation. Significantly, however, only one system reported "Board opposition" to development. It appears that virtually all districts have strong Board support, but still cite shortage of funds as the most serious problem.

Fourteen of the 35 districts reported "Teacher Opposition" as a significant impediment, but anecdotal comments such as, "We have their full support," "We've had no teacher opposition," and "They're really excited about computers," suggest that opposition by teachers to use of computers will not be a significant problem in the future.

Computers in Students' Homes

While not directly related to the focus of this study, we were interested in obtaining estimates of the number of students who have access to computers in their homes. It is anticipated that the "access gap" between affluent and poor homes will be a major problem in the future. Respondents were asked, "Do you have any data on the number of your students who have computers in their homes?" Only 2 schools had hard data; one reported "4" and another indicated "10%." Other estimates ranged from "1 student" to "substantial," to "25-50%"! Some futurists and hardware manufactures have predicted that schools may be by-passed in computer acquisition; homes, especially in affluent areas, will acquire computers far faster than schools and thus the impetus for change and innovation in schools may result from parent and student demands that schools adjust to the learning environments available in homes. It will be interesting to watch this phenomenon unfold.

"What are your plans for next year?"

This last question was open-ended; respondents were given the opportunity to discuss their plans, and problems, and possibly reservations about the broad issue of computer implementation. All districts described plans to expand their use of computers. Summary of the responses is impossible: a few selected quotes:

"We need to expand into our elementary schools."
"We have to get our teachers trained to use computers."
"We plan to develop a K-12 curriculum."
"We're a long way behind most other districts."
"We need more hardware, good software and teacher in-service."
"We plan to focus on evaluating software. Some of it is so bad!"
"Our psychologist is interested in studying the impact of technology on school learning."
"We have submitted a large grant proposal to start word processing, keyboarding and business education applications."
"Our School Board will probably approve a computer literacy requirement."
"We hope to offer machine language and Pascal to some of our teachers."
"We need to refine our goals and directions."

These illustrative examples of plans, goals and problems are indicative of the dynamic, and possibly confused, state of computer implementation. It is clear that some districts have developed goals, acquired equipment, trained teachers and are well along the road to integration of computers in their total school programs. Other schools have had a slower start; they are just beginning to explore the problems and potentials.

SUMMARY AND RECOMMENDATIONS

This sample of 35 school districts is not technically random so projections to all Wisconsin schools are not appropriate. However, we believe that the range in size and geographic distribution of the participating districts is such that a reasonably accurate picture of computer usage has been provided. As the first phase in a five-year study, these data provide a base to describe how schools are coping with implementation of computers in classroom usage, in-service training of teachers and long-range policy and procedural development.

The first steps have been taken; computers are in virtually all schools. What will the next steps be? How will schools expand their resources, both physical and human? What strategies will be most effective? Will public support continue, decrease, or increase. How will teachers react to the new demands--and opportunities--provided by increasingly sophisticated instructional technology?

The experience of these schools suggest the following recommended actions.

1) School boards and administrators must provide short term and long range policy direction for implementing computers.

2) District-wide planning committees, possibly involving parents, should be organized.

3) Extensive teacher in-service training must be organized.

4) Intensive training for selected district leadership personnel must be provided.

5) There are no "right" ways to implement computers; a wide variety of uses and strategies must be explored.

6) The dynamic development of hardware and software suggests that early closure on particular brands or models is premature.

7) Efforts must be made to integrate the use of computers in homes and schools.

Our goal is to complete this ambitious five-year study in the hope that useful information will be obtained, not only on the implementation of computers, but more importantly on the ways in which schools respond to and cope with the opportunities provided by educational innovations.

REFERENCES

(1) Center for Social Organization of Schools," School Uses of Microcomputers," Issues 1-4, 1983-1984. Johns Hopkins University, Baltimore, Md.

(2) Harmon, J. A., Anderson, M. E. and Bowles, B. P., "Wisconsin Public Schools Current Uses of Microcomputers and Their Future Needs and Plans," Paper presented at the meeting of the American Educational Research Association, New Orleans, April 25, 1984.

(3) Yin, Robert K., "Life Histories of Innovations: How New Practices Become Routinized," Public Administration Review, Jan./Feb. 1981, pp. 21-28.